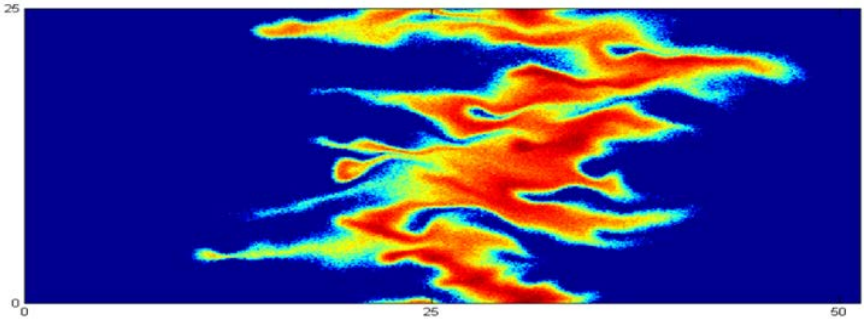
2015 Chester C. Kisiel Memorial Lecture
Hydrology and Water Resources
University of Arizona

But dispersion has no clothes!

Dr. Jesús Carrera Ramírez
Institute of Environmental Assessment and Water Research (IDAEA-CSIC)
Barcelona, Spain

Wednesday, March 4 at 4 pm
Kiva Auditorium in the Student Union

Reception immediately following talk in the Rincon Room



Solute transport is an essential ingredient of hydrology, both surface and subsurface, as well as many other natural sciences. Understanding solute transport is essential for assessing the fate of pollutants, how they spread in the environment and how they react. Transport is also required for understanding energy transfer, identifying the origin of water and, in general, for quantifying the water cycle. Transport has been traditionally represented by the Advection-Dispersion-Equation. I review its origins and limitations, especially in ground water. The truth is that dispersion does occur, but the way we represent it, using Fick's Law, fails to reproduce observations, grows with scale and, worst of all, overestimates mixing, which controls chemical reactions. In short, our representation of dispersion is good for nothing. Efforts have been made to seek alternative equations. I will also review them, but they have failed to become workable approaches. The conclusion is that, for the time being, we will keep working with the current dispersion approach. But, better beware; it is no emperor, just a poor Cinderella.

Jesús Carrera Ramírez is an HWRS Alumnus (Ph.D. '84) and current Research Professor, Department of Geosciences, GHS UPC-CSIC, Institute of Environmental Assessment and Water Research (IDAEA), CSIC, Barcelona, Spain; former Vice Provost for Research and Professor, Polytechnic University of Madrid; European Geosciences Union Henry Darcy Medalist (2004); and recipient of the Prince Sultan Abdulaziz International Prize in Groundwater (2014).

More information at: www.hwr.arizona.edu/2015-kisiel-lecture